

The logo for GadgEon, with 'Gadg' in blue and 'Eon' in orange.

Engineering Smartness

HOME SECURITY GATEWAY HUB – CASE STUDY

Version 01



Case Study - Home Security Gateway Hub



In the Home Automation/DIY market, there are several companies/users that purchase sensors from customer but are looking for hubs that can work with these sensors. The customer was looking for a hub where the hardware cost and the running cost is minimum. The customer will be offering this product as a combination of IoT Gateway + few sensors.

Technologies used

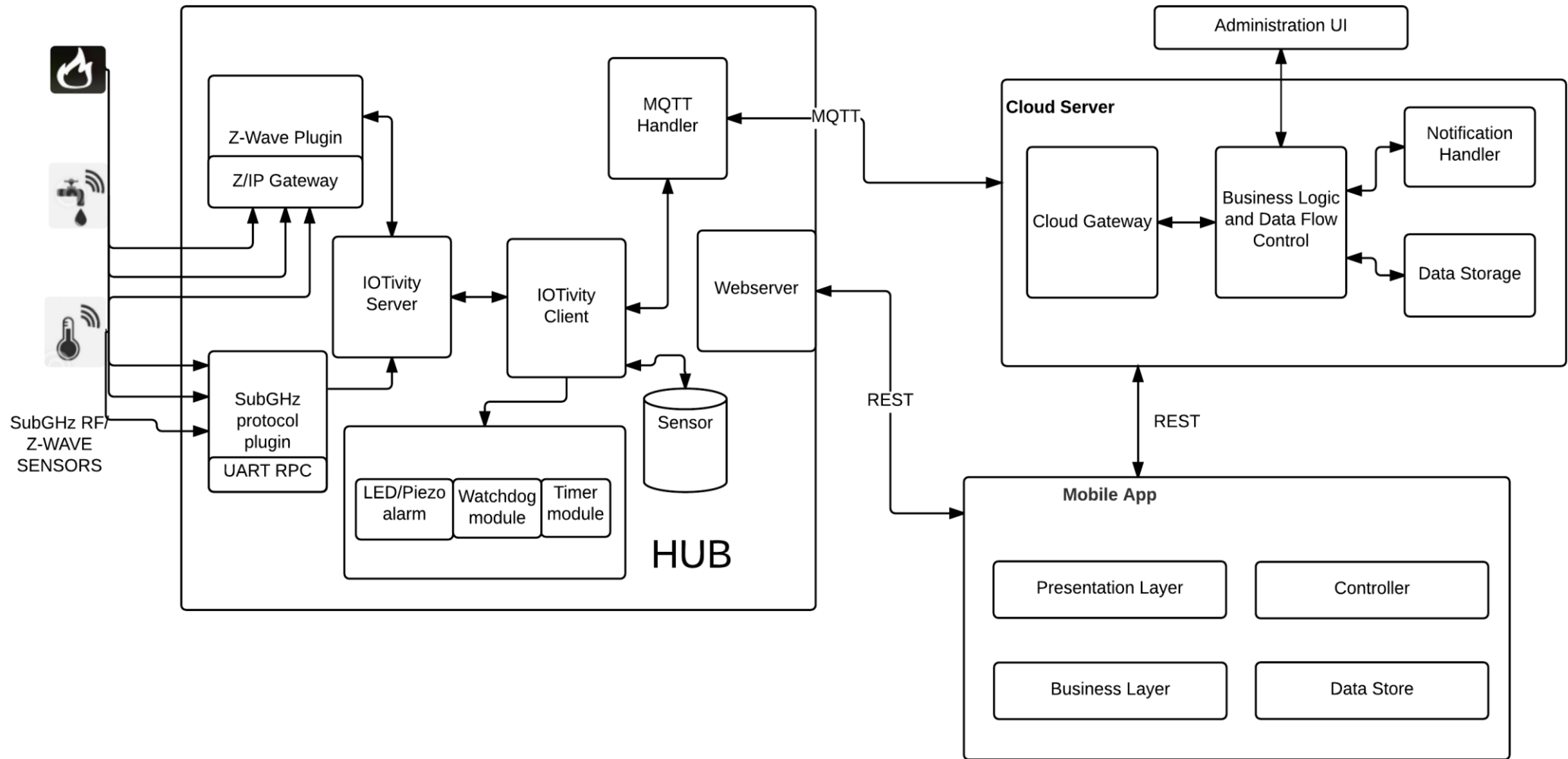
- MT7688,
- Zwave,
- SubGHz RF,
- OpenWRT,
- IoTivity,
- Node.js,
- iOS/Android and
- AWS
 - AWS API Gateway
 - AWS Lambda
 - Amazon SNS messaging service
 - Amazon DynamoDB

Results / Outcomes

- Developed complete system with home gateway, cloud application and mobile app.
- Brought down the overall cost of the system to few tens of dollars
- System can support millions of Hubs and users
- Simple and reliable Hub for securing homes against fire, flood and freeze
- Supports multiple wireless technologies for sensor and actuators at 433MHz and Z-wave
- Simple and easy to use mobile app for managing the hubs, receiving the notifications and control the actuators like thermostat and valves.
- Robust backend cloud application for managing users, hubs, sensors/actuators and handling real time notification via text messages, emails and push notifications
- Followed server less Microservices architecture for future enhancements and to reduce overall cost
- Administrator web application was developed to manage the users, hubs, and the complete system



Home Security Gateway Hub - System Architecture





Home Security Gateway Hub - System Architecture

- Architecture for complete system including Hub, Cloud and mobile application
- **Cloud Server**
 - Cloud server hosted in Amazon.
 - AWS IoT for communication with Hub over MQTT and HTTP.
 - AWS API Gateway for communication with the mobile App.
 - AWS Lambda is used as a server less compute service that runs code in response to events and automatically manages the compute resources required.
 - Amazon SNS messaging service is used to send notifications to Apple iOS, Android and other mobile devices, send emails and text messages.
 - Amazon DynamoDB. NoSQL database is used for storage
- **Hub Firmware**
 - U boot customization for the specific RAM and flash memory on the custom board.
 - IOTVity framework, 433MHz support for sensor integration
 - ZIP Gateway for Z-Wave Integration
 - Board manufacturing test software with testing for all interfaces, firmware upgrade support
 - MQTT for cloud communication with AWS IoT cloud service
 - Development of protocol stack for handling communication with the PIC MCU
 - Integration of SQLite DB
 - Security – Support for mutual authentication with cloud



Home Security Gateway Hub – System Description

- **Hardware design with low cost optimization, prototyping, board bring up**
 - Cadence allegro
 - Feasibility analysis for meeting sub 20\$ BoM cost . Comparing multiple MCU and MPU based system designs to arrive at the lowest cost option.
 - Identifying pin compatible alternatives for memory with different capacities (SPI flash and DDR) for future proofing the software.
- **Android and iOS Mobile App design and development for controlling and managing the hub**
 - MVC architecture
 - real-time notifications using APNS and FCM
 - REST API for direct configuration of the Hub
 - Followed the recommended design patterns from Apple and Google.

THANK YOU



For More Details, Let's Connect



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